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DEVELOPING RESIN MEDIA IN MAGNOLIOPSID CLASS OF CHRYSANTHEMUM PLANTS AS A BIOLOGY LEARNING MEDIA

Rahmadina¹, Efrida Pima Sari Tambunan²

^{1,2} Universitas Islam Negeri Sumatera, Medan, Indonesia

Email: rahmadinaandini@yahoo.com

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ABSTRACT

The purpose of this study was to determine the process of developing block resin media in the Magnoliopsida class Chrysanthemum plant and also the level of feasibility of the resin media as a biology learning media using development methods based on Borg & Gall combined with Dick & Carey learning in 5 stages, namely: (1) Stage of needs analysis, formulating instructional objectives, product validation, product trials, and revisions. Analysis of data in the form of a Likert scale to determine the feasibility of the media analyzed by qualitative descriptive. The results showed that the block resin media were suitable to be used as a learning medium based on the results of validation tests from material experts (79.1%), media experts (84.1%) and trials on lecturers and Peer Reviewers (84.05%), and product trials in individual trials (81.6%), small group trials (83%), limited field group trials (79.5%). Through this media, it is hoped that it can improve the effectiveness and motivation of students in the Biology department at the Faculty of Science and Technology of the State Islamic University of North Sumatra.

Keywords: block resin media, Chrysanthemum plants, learning media

INTRODUCTION

In developing the learning process that is increasing in this globalization era, it is highly recommended for students to be more productive in improving their learning outcomes in order to compete in the national and international world. However, the increase in learning outcomes is inseparable from the learning process that must be increased again. Therefore, the learning process can occur through the provision of learning media that can facilitate them in the learning process so that the use of this learning media can ultimately affect the student learning outcomes. This is in accordance with the statement of Nanik and Mauren in Nazila (2017) that the use of media in teaching science can improve student learning outcomes. Media can be used as a tool for a teacher or lecturer in the learning process and the messenger as a source of learning for students.

According to Asyhar (2011) learning media, which functions in the learning process can arouse new desires and interests, arouse motivation, direct the attention of students to concentrate on the content of the lesson and facilitate the achievement of objectives for understanding. This is in accordance with the statement of Kustandi and Sutjipto (2011) that learning media is a tool that can help the teaching-learning process and serves to clarify the meaning of the message.

Some functions of learning media included: 1) is as a means of helping to create a more effective learning situation; 2) is a component that is interconnected with other components in order to create the expected learning situation; 3) implies that the use of media in learning must always look at competencies and teaching materials; 4) is as an entertainment tool in learning to draw students' attention; 5) reduce the disease verbalism during the learning process (Nurul Afifah et al, 2017).

In this case, the media that will be used is the environment, which through this environment can introduce students to the biodiversity that exists on this earth. Considering the existence of this biodiversity is increasingly decreasing its population, so that students are demanding to be more maximal in maintaining its population, so its existence on this earth does not quickly become extinct. The learning process can be done through learning media in the form of dry-preserved specifications which are packaged in the form of resin media. According to the facts on the ground, the learning process has only been done verbally and conventionally using fresh media taken on fresh plants. If this is done continuously it can reduce the population of the plant, even in the learning process by using fresh materials it is demanded to be faster because the resilience of the plant cannot last long so the learning process is not maximally carried out.

Chrysanthemum is a shrub ornamental flower plant which is also called as seruni or golden flower originating from China. Chrysanthemum plants originated from China and Japan which spread to Europe and France in 1795. In Indonesia, demand for chrysanthemums is increasing year by year. Based on data from the Central Statistics Agency (2010) the demand for chrysanthemum in 2008 was 99,158,942 pieces and increased in 2009 by 107,847,072 pieces. Chrysanthemum production in 2009 was 107,847,072 pieces or chrysanthemum productivity was 11,07 pieces / m² in harvested area of 9,742,677 m², while in 2010 it increased to 10,024,605 m² and productivity was 17.58 pieces / m². Chrysanthemum plants without additional light have a faster harvest age. Chrysanthemum plants with additional red and white light have the longest harvest time because with the addition of red light, the stems of plants grow longer, thus giving rise to buds or flower initiation will be faster.

In the research of Tia et al explained that the chrysanthemum plant is one of the ornamental flower plants in the form of shrubs which is also known as seruni or golden flowers. Aside from being an ornamental plant, this chrysanthemum has several health benefits including relieving symptoms of influenza, headaches, and even cleaning the liver. The use of chrysanthemum as a medicinal plant is not widely known, especially in rural communities. Almost all parts of chrysanthemum plants can be used for medicinal materials. The stem, leaves and flowers of chrysanthemum plants (Tia Setiawati, et al. 2019).

The relevant studies on this research from several studies of development that use preserved media as a learning process included Sobirin, Isnawati and Ambarwati (2013) regarding the use of media that uses preserved specifications on porifers that can increase motivation, understanding, concepts and provide a clear picture as a learning medium. According to a research conducted by Artasari, et al (2017) explained that with the development of media by using a durable mollusca specimen it is appropriate to motivate students in the learning process tested through material experts. This research was also strengthened by the development research at Nazila (2017) which says that the resin media used as an alternative of learning resources in biology have qualities that are very suitable for being used as learning with block resin media.

Based on observations made at the Biology Department at the Faculty of Science and Technology of UINSU Medan in November 2017, data were obtained that the learning process that occurred in students was less effective because the students were told to bring fresh plants every time they made the learning process in certain subjects. Even, students

had to look for plant material in the morning about one or two hours before this learning process takes place so that the other learning process must be interrupted. Even when observing the plant is done many plants that cannot last long even some plants are wilted and dry because it is too the length of the learning process and also the plants taken too quickly, this is because it must be adjusted to other hours of study so that observations are difficult to do especially in observing morphology and anatomy.

This resin media is one of reality media. According to Pribadi and Katrin in Nazila (2017), said that reality media can provide a direct learning experience so students can observe specifications according to the actual shape, size, and color that can last a long time and can be observed repeatedly.

Resin media has many advantages compared to fresh media. It is very productive as a learning media for students, especially in the Biology department at the Faculty of Science, UINSU, one of the advantages that can be obtained by using this resin media is: quite a long time during the learning process; 2) This media cannot be easily damaged in its physical form; 3) The specifications can be chosen in an abundant place and in the right season so that it does not disturb the environmental balance; 4) This resin can also show important parts of the object to be observed so that it can be used for observation, data collection, application of concepts, classification, and communication (Nazila, 2017); 5) Able to facilitate the introduction of objects that are difficult to find, especially in certain parts of a species; 6) Able to generate motivation and learning interest of students (Budiwati, 2015). Although this media has many advantages, but this media also has several disadvantages including 1) This media can cause unpleasant odors because it comes from chemicals; 2) This media must be very thorough in its manufacture because it is easily cracked and opaque in color, this is very difficult in observing specifications if the color is opaque or cloudy. (Nazila, 2017).

One location that has an abundance of Chrysanthemum plants in the Magnoliopsida class is in the area around Medan, especially some plants will be obtained in the UINSU Medan environment. The results of this inventory of plants are expected to be an alternative source of learning as a medium of learning in the form of three-dimensional resin media in the Biology department of the Faculty of Science and Technology so as to increase students' understanding and level of creativity.

The purpose of this study was to determine the process of developing block resin media in Chrysanthemum plants and also the level of eligibility as a biology learning

medium by using a development method based on Borg & Gall combined with Dick & Carey's learning.

RESEARCH METHODOLOGY

This research was conducted at the Biology Study Program, Faculty of Science and Technology, North Sumatra State Islamic University, located on Jl. IAIN No.1 Medan semester III. This research was conducted in December 2017 until October 2018.

This study uses a development method based on Borg & Gall combined with Dick & Carey's learning in 5 stages, namely: 1) The needs analysis phase, formulating instructional goals, product validation, product trials, and revisions (Borg and Gall, 1983). Data analysis in the form of a Likert scale to determine the feasibility of the media analyzed descriptively qualitative.

Table 1. The answer criteria of validation instrument items with Likert scale and its score and percentage

No	Answer	Score
1	Very Good	4
2	Good	3
3	Poor	2
4	Bad	1

(Sugiyono, 2012)

The data collection method uses validation and response methods which are then analyzed descriptively qualitatively based on the ideal assessment category by calculating the percentage of indicators of the problematic aspects for each category in the developed resin media.

$$\text{Media score percentage} = \frac{\text{total indicator per category}}{\text{Total indicator total category}} \times 100\%$$

From the results of calculations using the formula above, figures are generated in the form of a percent. The score classification is then converted into a classification in the form of a percentage (Sugiyono, 2012), then interpreted in the qualitative sentences listed in the following Table.

Table 2. The percentage scale of rating product quality

Score	Interval Percentage	Criteria	
		Expert	Lecturer and Student
4	$81\% \leq X \leq 100\%$	Very good	Strongly Agree
3	$61\% \leq X \leq 80\%$	Good	Agree
2	$41\% \leq X \leq 60\%$	Average	Disagree
1	$21\% \leq X \leq 40\%$	Not good	Strongly disagree

(Sugiyono, 2012)

FINDING AND DISCUSSION

Block resin media in Chrysanthemum plants using a development method based on Borg & Gall combined with Dick & Carey's learning in 5 stages, namely: 1) Analysis of the needs and characteristics of students; 2) The stage of formulating instructional goals; 3) Stage of product validation; 4) Stage of product testing, and; 5) Stage of revision. This learning media is composed of preserved flower organs using block resin media, classification and description of plants and manuals on block resin media. This learning media is designed and validated by a team of experts, including media experts and material experts to see the feasibility of the developed learning media. After the product is declared feasible by a team of experts, then it is tested on Biology department students at the Faculty of Science and Technology of UIN-SU.

Based on the experts' assessment of the quality of the presentation of the content of the material assessed in terms of material coverage has an average percentage of 71% with the criteria of "Good", the accuracy of the material has an average percentage of 88% with the criteria of "Very Good", the latest material has an average of - the average percentage of 69% with the criteria of "Good", and stimulating curiosity has an average percentage of 88% with the criteria of "Very Good". Therefore, based on each aspect of the indicators assessed as having an overall rating with an average percentage level of 79.1% with the criteria of "Good".

After evaluating the material expert, the validation assessment of the media expert is continued. The assessment obtained on the validation results according to the media presentation technique has an average percentage of 86% with the criterion "Very Good", while the supporters of the media presentation have an average percentage of 79% with

the criteria of "Good". Therefore, based on the results of the validation assessment from media experts, the overall average percentage was 84.1% with the criteria of "Very Good".

Based on the assessment carried out in testing the biology lecturers and Peer Reviewer the results obtained on the component of media presentation in the aspect of media presentation techniques with an average percentage of 82% with the criteria of "Very Good", then the supporting aspects of media presentation which has an average percentage a number of 84% with the criteria "Very Good", while the component presentation of content on the material with the aspect of material coverage has an average percentage of 88% with the criteria "Very Good", on the aspect of Material Accuracy has an average percentage of 82% with the criteria of "Very Good" ", The Material Update aspect has an average of 88% with the criteria of" Very Good ", the Stimulating Curiosity aspect has an average percentage of 84% with the criteria of" Very Good ". Therefore, based on the assessment of product trials conducted by a team of biology lecturers and peer reviewers, the overall results were obtained with an average percentage of 84.05% with the criteria of "Very Good"

Based on the results of the assessment conducted on individual product trials conducted on 3 respondents obtained results based on aspects of media effectiveness indicators which have an average percentage of 85% with the criteria of "Strongly Agree", then in the aspect of student motivation to learn average - the average percentage of 80% with the criteria of "Agree", and the last aspect is the learning activities of students who have an average percentage of "80% with the criteria" Agree ". The limited testing of this product to students conducted individually produces an overall indication that students strongly agree with having an average percentage of 81.6% using this block resin media on the Chrysantemum plant material in the Magnoliopsida class because it greatly affects students in the effectiveness of the used media, motivation and learning activities and make them more enthusiastic in learning.

After an individual product testing is carried out, then it is done in small groups to get the effect of using the media on a larger scale even though it is still in a small group environment. However, the results of assessments that have been carried out in this small group trial in a limited number of 9 people have produced assessments based on aspects of indicators of the effectiveness of the media which has an average percentage of 85% with the criteria of "Strongly Agree", on aspects of student motivation to have the average percentage of 83% with the criteria "strongly agree", and the last aspect of student learning activities has an average of 81% with the criteria "strongly agree". Based on the

results of the assessment of the use of resin as a medium of learning as a whole has an average of 83% with the criteria "strongly agree". From the results of this assessment it was concluded that the resin media was very feasible and students strongly agreed if used in the learning process.

Based on the results of the assessment found in the limited field testing that has been done, the results show that the use of block resin media in the Chrysantemum plant in the Magnoliopsida class is very suitable for use as a learning medium in the learning process of biology, this is based on the aspect of media effectiveness which has an average of 87 % with the criteria of "strongly agree", then the aspects of student motivation have an average percentage of 81% with the criteria "strongly agree" and aspects of student learning activities have an average of 81% with the criteria "strongly agree". Therefore based on the results of assessments that have been carried out in a broader overall scope obtained results that students strongly agree with the average percentage of 83% of this block resin media is used as a learning media and this media is very feasible if used in the biology learning process because it has effectiveness of the media and can also increase student motivation and learning activities that make students more enthusiastic and creative in learning

RESEARCH FINDING

Product revision

a. The First Revision

Based on the results of data analysis of evaluations that have been validated by material experts and media experts, the revised data results are obtained, namely: 1) The developed media should have complete and clear plant structure information on each part of the flower structure; 2) it should be stated systematically on the media of the plant so that it is easily known to those who see it; 3) in this media should have a good and attractive brightness level so that it is easy for students to observe the morphology of the plant parts; 4) the material in the manual should display a description of the media in a clearer and more detailed manner as well as how to use the media and also the detailed working procedures; 5) it is better for books that support these media to have more interesting designs. Based on the results of the advice given by media experts and material experts, the authors make improvements in accordance with what has been suggested to be tested again in further testing.

b. The Second Revision

Based on the results of data analysis of product testing carried out individually, small groups, and limited field tests, the results obtained that must be revised are: 1) the media should be clarified again writing on the media so that it is easily visible; 2) the media should be neater in shape and also the information in the media so that the writing is written with good writing; 3) the book should be as complete as possible.

c. The Third Revision

Based on the results of the assessment and suggestions from media experts and material experts as well as product tests both for students and lecturers, the researchers made revisions to the best possible improvements to achieve the desired results.

Discussion

Based on the results of research conducted by researchers on material experts, the results are obtained that the material contained in the block resin media is suitable for use as a learning medium with an average score based on 71% material coverage, 88% material's accuracy, 69% material up-to-date, and stimulating material curiosity 88% and overall results obtained 79.1% with the criteria of "Good" so that this material is worthy of use in the learning process so as to increase student motivation. The results of this study are supported by Nazila's study (2017) which says that the block resin media in mosses has a good overall quality with an ideal percentage according to material experts 81.66%, media experts 94%, peer review 89.5%, biology teachers 81 , 8%, while the responses of students getting the category strongly agree with the percentage of ideals 88%. The results of this validation according to the material experts can be seen in the following diagram:

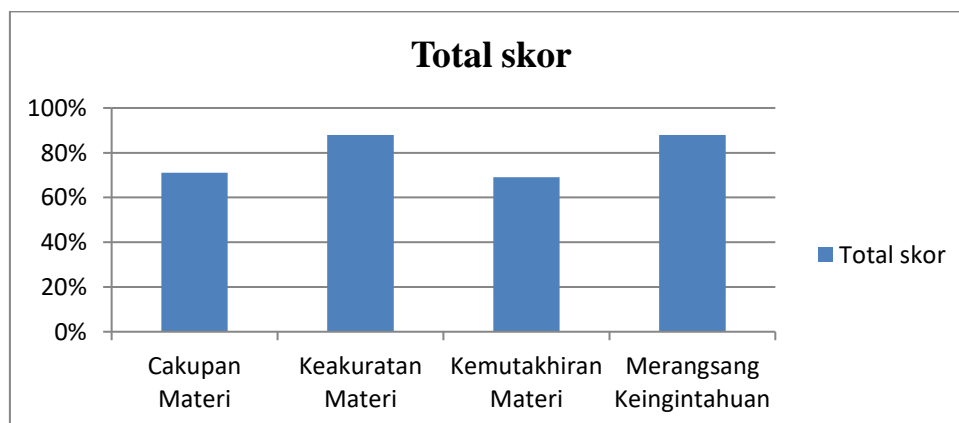


Figure 1. Diagram of Assessing Validation Result from Expert

Based on the results of research conducted by media experts have a level of worthiness with an overall value of 84.1%. In this case the resin media used are very feasible in the process of learning biology based on aspects of media presentation techniques with an average of 86% and supporting media presentation with an average of 79%. The assessment process of this media has received suggestions for improvement from media experts and has been revised so that the media displayed are as expected by the validation experts. The assessment of block resin media is expected to fulfill according to the wishes of researchers, namely to facilitate students in the learning process, especially in the case of preservation of plants. The results of this assessment can be seen clearly through the following diagram:

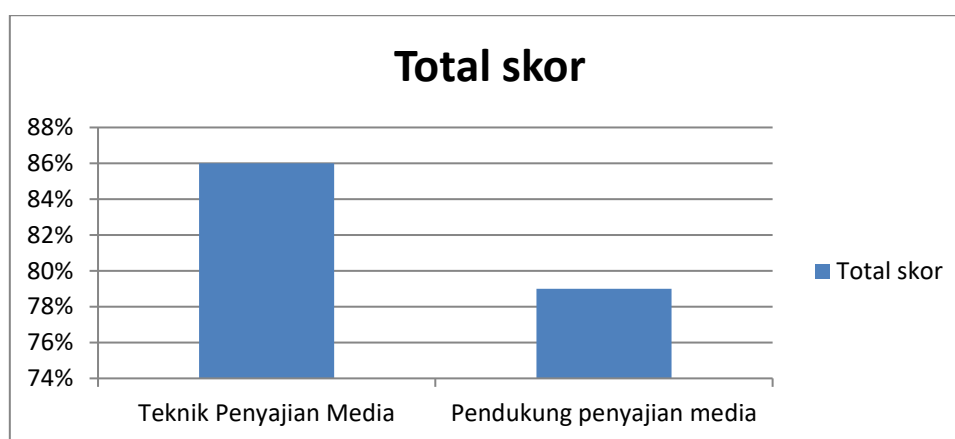


Figure 2. Diagram of Assessment Result by Media Validation Expert

The evaluation of this resin media product was also carried out by several lecturers and peer reviewers, this was done with the aim of knowing the level of validity and feasibility of the media as a medium for learning biology in *Chrysanthemum* plants. Therefore, the results obtained from the assessment obtained an average of 84.05% with the criteria of "very good" so that this media is very feasible to be used as a learning medium, besides will able to facilitate the learning process, especially regarding plant preservation. The results of this assessment can be seen in the following diagram:

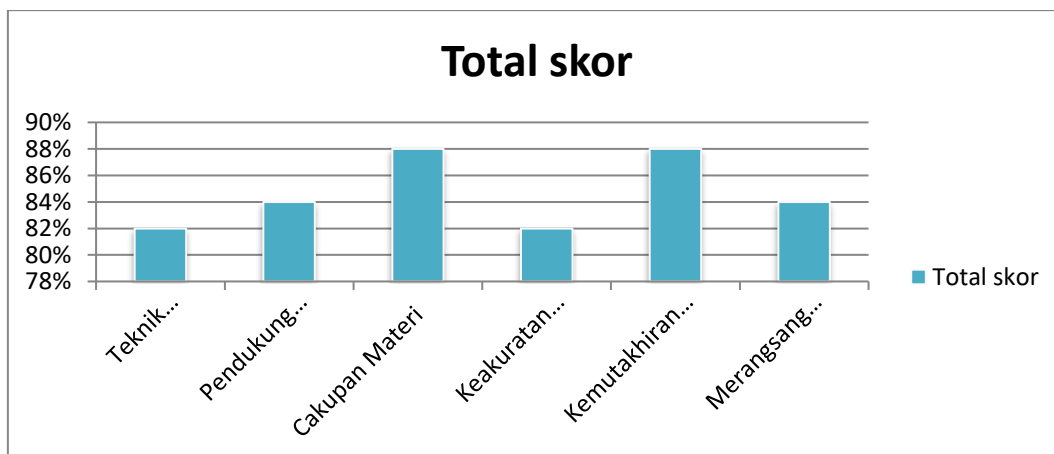


Figure 3. Diagram of Result of the Study from questionnaire validation on lecturer and peer reviewer

The evaluation of this resin media product is also carried out through product trials that occur in 3 (three) revisions, namely through individual trials, small group trials, and limited field group trials. Based on the results of the assessment on product trials that have been carried out, the results obtained by having an average in individual trials overall amounted to 81.6% with the criteria "strongly agree", small group trials as a whole with an average percentage of 83% with "strongly agree" criteria, and product testing in the field group is limited overall with an average of 79.5% with the "Agree" criteria so that it can be concluded that this resin media is suitable for use as an alternative in the learning process of biology in *Chrysanthemum* plants in class Magnoliopsida because it greatly influences students in the effectiveness of the media used, their motivation and learning activities and makes students better understand the material provided by their lecturers and is easier to obtain morphology from plants because these plants have been preserved permanently which can last a long time. The results of this study can be seen clearly in the following diagram:

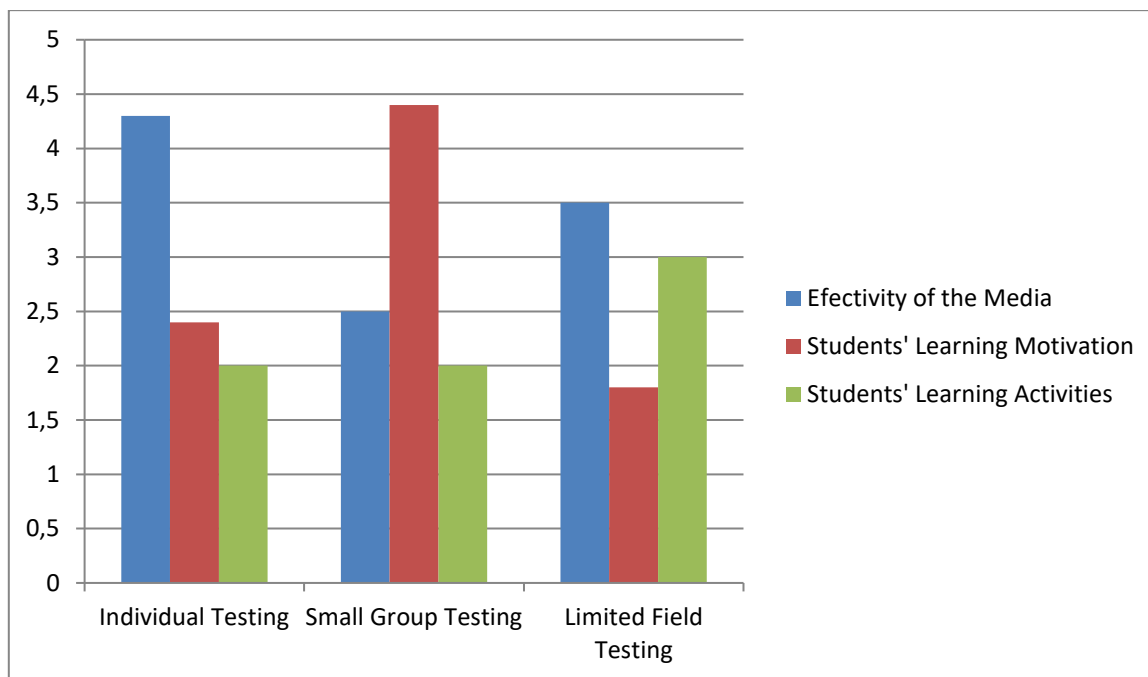


Figure 4. Diagram of Resin Media Block Trial Result on Chrysanthemum

Based on the results of this study obtained data that this study is worthy of being used as a medium of learning biology, this research is related to several development studies that use durable media as a learning process including Sobirin, Isnawati and Ambarwati (2013) regarding the use of media that uses durable specifications in porphera which can increase motivation, understanding, concepts and provide a clear picture of learning for class X students, with the results of the study showing that the media preserved porifera is theoretically feasible with a percentage of 95.55% (very feasible category) and gets a positive response from students with an empirical feasibility percentage of 98.5%, (very feasible category), the results of the media suitability criteria with a percentage of 98.75% (very feasible category) were used as learning media.

This research is also strengthened by the research development on Nazila (2017) which says that the resin media used as an alternative source of learning in biology has a quality that is very feasible to use, this is based on the results of an assessment conducted by several media experts, material experts, peer reviewers, and biology teachers with the percentage of ideals 94%, 81.66%, 89.5%, and 81.8% and this is also based on responses from students who stated strongly agree if learning with resin block media with a percentage of 88%.

Limitations

Limitations experienced in the research on developing this block resin media as an alternative in the learning process are: (1) The process of making resin media has many obstacles because many plants to be preserved experience a drought process that is not as expected, especially in the flower part due to the morphological structure many flowers do not have a strong enough resistance so that when the manufacturing process occurs there are many flowers that dry immediately, some are moldy because of the mixing of the flower structure with alcohol mixed into the resin and catalyst; 2) The trials conducted in this study were only carried out until field testing was limited with a sample of 25 students so that it was possible to experience bias and less accurate factors from the data generated; 3) Testing is carried out only using a questionnaire while testing using tests to obtain more accurate learning outcomes is not carried out due to time and cost constraints in this case so the research is conducted only at the media development stage only and does not reach the evaluation stage. Therefore, the next researcher will be tested until the final evaluation phase, so that the results carried out are more optimal results; 4) limitations of tools and materials that are difficult to find, especially in resins that are suitable for plant preservation because not all types of resins can be used for dry preservation, especially in plants that have a soft level of body structure and that can damage their body structure if preserved with resin even causing a level of dryness that is severe enough to cause a vacuum in the leaf structure and also its color change.

CONCLUSION

Based on the formulation of the problem, objectives, observations and discussion in research on the development of block resin media on *Chrysanthemum* plants in the Magnoliopsida class as an alternative in the biology learning process of the Biology department at the Faculty of Science and Technology of North Sumatra UIN, it can be concluded that:

1. Block resin media in *Chrysanthemum* plants using Borg & Gall based development methods combined with Dick & Carey's learning in 5 stages, namely: 1) Analysis of students' needs and characteristics; 2) The stage of formulating instructional goals; 3) Stage of product validation; 4) Stage of product testing, and; 5) Stage of revision. This learning media is composed of preserved flower organs using block resin media, classification and description of plants and manuals on block resin media. This learning media is designed and validated by a team of experts, including media

experts and material experts to see the feasibility of the developed learning media. After the product is declared feasible by a team of experts, then it is tested on Biology department students at the UIN-SU Faculty of Science and Technology

2. The results of the validation test conducted by material experts with an average percentage of 79.1% with the criteria of "Good" and media experts with an average percentage of 84.1% with the criteria of "Very Good" and trials conducted on lecturers and Peer Rieviever with an average of 84.05% with the criteria "Very Good, and the results of trials that have been carried out on individual trials with an average percentage of 81.6% with the criteria "strongly agree ", in small group trials with average - an average of 83% with the criteria of "Strongly Agree", in limited field group trials with an average of 79.5% with the criteria of "Agree". Therefore, the use of this block resin media is appropriate to be used as a learning medium that can motivate student learning so that students have enthusiasm and innovation in student learning.

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